

**NRC Staff Responses to Industry Pre-Meeting Questions and Comments on Bulletin 2003-01
Provided in Support of June 30, 2003 NRC Public Meeting**

The staff has provided the responses to the industry comments and questions below to assist licensees in responding to Bulletin 2003-01. The staff's responses are not requirements, formal regulatory guidance, or formal NRC staff positions. As such, the staff's responses do not supersede such requirements and guidance, or other specific guidance which the NRC is developing to evaluate responses to Bulletin 2003-01 or in regard to other GSI-191 regulatory efforts. If there are any significant changes as a result of today's meeting, the NRC will provide a revised response.

#	Topic	Question/Comment	NRC Response
1*	General	<p>It is acknowledged that there may be some plant-specific issues related to ECCS operation in Post-LOCA recirculation. These issues may stem from plant-specific compliance with what is presently recognized as an insufficient regulatory margin requirement, e.g., 50% blockage. It is also recognized that a few specific plants may have had some related problems and issues. However, it seems inappropriate to require an accelerated bulletin response from the remaining PWR plants. The 60 day response also seems premature considering the fact that the guidance provided (DG-1107) is draft and industry comments on this have not yet been resolved. An extension of the response period to permit industry time to complete development of their evaluation and resolution methodology is suggested. In the interim, some of the suggested interim compensatory measures may be appropriate.</p> <p>Some of the interim compensatory measures that are considered appropriate, include:</p> <ul style="list-style-type: none"> o More aggressive containment cleaning and increased foreign material controls o Ensuring containment drainage paths are unblocked o Ensuring sump screens are free of adverse gaps and breaches <p>However, some of the interim compensatory measures may be inappropriate, such as the emergency operating procedural modifications that could result in injection of</p>	<p>The staff agrees that the potential exists for the ECCS and CSS performance of certain PWRs to be degraded by debris blockage effects and is addressing these concerns with Bulletin 2003-01 and a proposed generic letter. Although not all PWRs may be adversely affected by debris blockage effects, it is not definitively known which plants are potentially susceptible. As a result, Bulletin 2003-01 requests information from all PWR licensees concerning whether interim measures are appropriate for their plants, rather than directly requesting that licensees take action to implement the measures. PWR licensees that are able to justify their insusceptibility to adverse debris blockage affects may reply to Bulletin 2003-01 by choosing Option 1 and implementing no compensatory measures. Other PWR licensees choosing Option 2 may also be able to justify implementing only a limited set of the example interim measures listed in Bulletin 2003-01. As such, the staff considers that PWR licensees with adequate sumps are not unduly burdened by the bulletin without an extension to the response period.</p> <p>Although only requesting information concerning the 3 interim measures suggested in the comment could also ensure that PWR licensees with adequate sumps are not unduly burdened, the staff did not implement this approach because the 3 measures alone may not be acceptable for some PWRs with increased susceptibilities to debris blockage. The staff recognizes that the example interim measures in Bulletin 2003-01 may require detailed and careful safety reviews, and the bulletin allows licensees that are unable to implement an appropriate compensatory measure within 60</p>

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		<p>undetermined quantities of water into containment or shutting down portions of the ECCS. Sufficient time needs to be provided for industry to study these suggested interim measures. Recall that one of the factors that set the stage for the TMI accident was a concern for pressurized thermal shock, which, in addition to other factors, may have led to inappropriate shutdown of the ECCS. LA-UR-02-7652, "The Impact of Recovery From Debris-Induced Loss of ECCS Recirculation on PWR Core Damage Frequency" presents some possible actions to recover or mitigate from a situation where sump blockage had or may have occurred. Implementation of any such actions, which may include shutting down portions of the ECCS, injecting water into containment from sources in addition to the normal source must be carefully evaluated to assure that they are appropriate, effective, and will contribute to mitigation and/or recovery from the situation, and not contribute to or exacerbate a core damage accident. It may take some time to thoroughly review and translate appropriate mitigation or recovery suggestions into emergency procedure guidelines.</p>	<p>days to justify why it was not practical to implement the measure sooner. The example compensatory measures in Bulletin 2003-01 are not intended to be blindly implemented. Prior to making any change, licensees are responsible for first ensuring that the change does not adversely impact plant safety.</p> <p>Finally, the staff has expressed its conclusion that interim compensatory measures may be appropriate to mitigate post-accident debris blockage for certain PWRs as early as the GSI-191 public meeting on March 28, 2002. At subsequent public meetings, the staff additionally discussed with industry representatives the prioritization or binning of plants based on plant-specific debris blockage susceptibilities. In lieu of voluntary industry initiatives to accomplish these objectives, it became necessary for the staff to issue a generic communication requesting that PWR licensees provide the information necessary to determine that licensees are adequately responding to potentially degraded sump performance. The staff realizes that the bulletin requests a response prior to the completion of regulatory and industry guidance. However, the very objective of the bulletin is that the licensees of PWRs with potentially degraded sumps should consider implementing interim measures prior to completing debris blockage evaluations – not to continue taking limited or no action until acceptable evaluation methodologies become available.</p>
2*	General	<p>What guidance or measures (if any) will NRC use to evaluate the adequacy of licensee responses to the Bulletin? If this guidance exists, can it be made publicly available for use by licensees in preparing their response to the Bulletin? If it is not currently available, can NRC identify the key elements that NRC will be looking for in defining response adequacy?</p>	<p>The staff is developing criteria for evaluating bulletin responses, and these criteria are not currently available to the public. The staff's review guidance includes screening criteria for technical reviewers and a temporary instruction to guide inspection staff. The temporary instruction will be made publicly available when it is completed.</p>

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3*	Comp Action	<p>Westinghouse Owners Group Interim compensatory measures that are outside of the current design and licensing basis will be utilized. For example:</p> <p>Consistent with the severe accident management guidance (SAMG), components that are not qualified to operate in an adverse environment will be credited as alternate flow paths to make up to the RWST or to restore ECCS pump NPSH.</p> <p>Consistent with the SAMG, non-Reg Guide 1.97 instrumentation will be credited.</p>	As the interim compensatory measures requested in the bulletin are intended as risk reduction measures, the staff finds that non-qualified components and non-Regulatory Guide 1.97 instrumentation may be used for this purpose.
4*	Comp Action	<p>Westinghouse Owners Group If an alternate borated water source is utilized after the ECCS has been aligned for cold leg recirculation, do the components associated with the alternate borated water source have to meet the minimum leakage assumptions of the off-site and control room habitability dose assessments?</p>	The injection of alternative water sources to cool the reactor core and containment atmosphere should not result in control room and offsite doses to be exceeded. If clean water and non-contaminated piping are used for the alternative water supply path, then leakage from this flowpath would not contribute to the accident source term.
5*	Comp Action	<p>Westinghouse Owners Group If the containment spray pumps are turned off to restore the NPSH margin by decreasing the flow through the containment sump, can the results of the off-site and control room habitability dose assessments, that utilize the Alternative Source Term to credit these pumps be exceeded?</p>	If all containment spray pumps are turned off to ensure or restore adequate net positive suction head margin for emergency core cooling system pumps, it is possible that control room and offsite doses could be exceeded during an accident if the core were damaged. The staff would not consider exceeding regulatory dose limits during an actual accident to be acceptable. However, if the emergency core cooling system functions successfully, in actuality, no source term would exist, and these dose limits would not actually be exceeded if the containment sprays were operated intermittently.
6*	Comp Action	<p>Westinghouse Owners Group Can operator actions that would require entry into high radiation areas be credited?</p>	The staff could not allow credit without prior review. Credit could be allowed upon reviewing such factors as the type of action and time available, results from the analysis of the affected area per NUREG-0737, item II.B.2, and demonstration of the ability to successfully complete the actions.

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7*	Comp Action	Westinghouse Owners Group There is a potential for inconsistency with the safety analysis assumptions if ESF pumps are stopped early (before the transfer to recirculation occurs) to delay the transfer to the sump.	BL 2003-01 listed a possible interim compensatory measure as procedural modifications, <u>if appropriate</u> (emphasis added), and provided examples that included shutting down redundant pumps that are not necessary to provide <u>required</u> flows to cool the containment and reactor core. The staff agrees with the Westinghouse Owners Group (WOG) that there is a potential for inconsistency with the safety analysis assumptions if emergency safeguards pumps are stopped under steps where existing emergency operating procedures (EOPs) would direct that the pumps remain running. Such action would have to be both appropriate and be shown to be consistent with required flows. In addition to safety analysis considerations, such actions must be approached carefully because they are contradictory to most operator training and may contradict the defense-in-depth and symptom-oriented philosophies that underlie the EOPs. Further, to be appropriate, the benefits of such actions would have to be demonstrated to outweigh the potential drawbacks. Although this demonstration and other aspects of implementing such changes may involve difficulty, the intent of the bulletin is that licensees should implement such changes if appropriate.
8*	Comp Action	Westinghouse Owners Group Leak-before-break will be used as a justification in the determination of interim compensatory measures.	Evaluations used to demonstrate that piping will most likely leak before rupturing increases confidence that the frequency of a pipe rupturing is very low. These evaluations do not, however, demonstrate that the frequency is zero. Therefore, although the staff has used leak-before-break approvals for the primary piping of all PWRs as a part of the justification for its resolution schedule for Generic Safety Issue 191, it does not preclude the necessity of addressing debris generation from ruptures of qualified piping. By the same token, the staff does not consider it acceptable to invoke leak-before-break approval in lieu of implementing appropriate interim compensatory measures.
9*	Comp Action	Westinghouse Owners Group Components that do not satisfy the single failure criteria may be credited.	As the interim compensatory measures requested in the bulletin are intended as risk reduction measures, the staff finds that non-qualified components and non-Regulatory Guide 1.97 instrumentation may be used for this purpose.

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10 *	Comp Action	Westinghouse Owners Group Existing generic emergency response guidance (ERGs) and SAMGs that address the loss of ECCS recirculation will be credited as interim compensatory measures.	Existing ERGs and SAMGs that address post-accident debris blockage may be credited as interim measures to the extent that they are effective in reducing potential risk associated with debris blockage effects.
11 *	Comp Action	Westinghouse Owners Group What is the intent of “operator training on indications of and responses to sump clogging?” Is formal operator training required on all of the interim compensatory measures, or just on the phenomenon and indications used to recognize it?	The example compensatory measures in Bulletin 2003-01 include training on both “indications of and responses to sump clogging.” Thus, the example measures include training on operator actions used to recover from sump clogging, not only indications of clogging. However, the staff stresses that the need for interim compensatory measures is plant-specific. Licensees may be able to justify that less operator training is necessary than the example based on the specific conditions at their plants.
12 *	Procedures	Westinghouse Owners Group The EOPs are written as symptom based procedures. Some of the suggested compensatory measures discussed in Bulletin 2003-01 appear to be event based. How should this inconsistency be addressed with respect to the EOPs?	In the staff’s view, an action is not inherently symptom-based or event-based; rather, it is the framework of decision criteria that control whether a given action will be performed that causes a procedure to be either symptom or event based. In the same way that operator responses are directed in response to symptoms of a wide and diverse spectrum of possible events in the current EOPs, so to does the staff suggest that the interim compensatory measures listed in Bulletin 2003-01 can be written in a symptomatic fashion. The staff does not consider debris blockage to be fundamentally different from any other possible event or occurrence in this respect.
13 *		B&WOG OSC The bulletin maintains the applicability of 10CFR50.46 and thus, Appendix K and GDC 35 requirements, but proposes interim compensatory measures counter to these requirements. Please clarify. (e.g. abundant core cooling requires full ECCS flow while sump clogging mitigation measures may require throttling that flow, maintaining 120% decay heat removal requirement may unnecessarily restrict the ECCS throttling margin available.)	The B&WOG OSC requested clarification between meeting 10 CFR 50.46, including Appendix K and GDC requirements, and interim compensatory measures that are counter to these requirements. With the exception of 10 CFR 50.54(x) applicability to a license condition or a technical specification, regulatory requirements must be met unless an exemption has been granted. The requirements of GDC 35, 10 CFR 50.46 and Appendix K allow licensees flexibility in demonstrating compliance. Therefore, the actions proposed by the Bulletin are not contrary to the requirements.

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14 *	Comp Action	B&WOG OSC In the Discussion section on Page 7, the bulletin states "Possible" interim measures may include several bulleted items, however, the Option 2 discussion on Page 9 states that any interim compensatory measures not implemented must be justified. This seems inconsistent. Please clarify.	The interim measures listed in the bulletin are examples of measures that may be appropriate for a typical PWR. However, for various reasons, certain measures may not be necessary or appropriate for some plants, and for other plants, additional plant-specific measures may be appropriate. Although licensees are not required to implement all or any of the example measures, for those measures that are not implemented, the staff seeks a basis to ensure that licensees have met the intent of the bulletin. If licensees responded to the bulletin without providing a basis for any compensatory measures that they did not implement, the staff would be unable to verify that licensees had taken all of the interim measures that were appropriate for their plants.
15 *	Non Reg. Guide 1.97 Instruments	B&WOG OSC Please confirm that the use of non-Reg. Guide 1.97 instruments to recognize and respond to sump clogging issues is acceptable (e.g. Pump amp meters, Pump discharge pressure).	As the interim compensatory measures requested in the bulletin are intended as risk reduction measures, the staff finds that non-Regulatory Guide 1.97 instrumentation may be used for this purpose.
16 *	Option 2	B&WOG OSC For Option 2, what level of justification is expected for any compensatory measures not implemented?	Given that the response period for Bulletin 2003-01 is 60 days, the staff is not expecting lengthy, detailed analysis. Possible justification for not implementing compensatory measure may include that the measure is not applicable for a particular plant, that preliminary analyses indicate the measure to be unnecessary, or that the measure may have an adverse effect on plant safety.
17 *		If the NRC allows an interim period for repairs/modifications after the evaluation is complete, will enforcement discretion be exercised if the compensatory measures are in place until repairs/modifications are complete.	The intent of Bulletin 2003-01 is to ensure that potential risks due to debris blockage are minimized until evaluations of sump adequacy are completed. The staff is proposing a future generic letter to address post-accident debris blockage evaluations and any associated corrective actions which may be identified. Therefore, as this question relates to the pre-decisional generic letter that is currently being developed, and not Bulletin 2003-01, the staff will defer responding to this question until the appropriate time.

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18		At present there is no approved guidance available to PWR licensees. What mechanism is available for those plants to define their level of compliance with regard to the issues identified in the Bulletin?	As stated in Bulletin 2003-01, one acceptable method for justifying an Option 1 response would be to have performed a debris blockage evaluation that is consistent with Draft Regulatory Guide 1107. Further detail on performing plant-specific debris blockage analyses are available in NUREG/CR-6808, "Knowledge Base for the Effect of Debris on Pressurized Water Reactor Emergency Core Cooling Sump Performance." Other guidance for performing debris blockage evaluations includes the Utility Resolution Guidance created by the Boiling Water Reactors Owners Group and additional technical reports referenced in NUREG/CR-6808. Plants that have not completed a debris blockage evaluation of this nature may respond to Bulletin 2003-01 by choosing Option 2.
19	Addressing Bulletin Concerns	Is some discussion in the response required relative to the 3 mechanistic concerns identified on pages 4 and 5 of the Bulletin, or are these included for background information, and for disposition during the more-detailed evaluation phase of GSI-191 resolution? Specifically: <ul style="list-style-type: none"> • Structural reinforcement of the sump screen • Flowpath restrictions ('chokepoints') • Downstream equipment concerns (CS nozzles, HPI pump clearances, HPI throttle valves, fuel assembly inlet screens, etc.) 	All the debris blockage effects discussed in Bulletin 2003-01 (including loss of pumps' net positive suction head (NPSH) margins and the three effects mentioned in the comment) are within the scope of the bulletin's intent. Thus, the example interim compensatory measures listed in the bulletin do not apply exclusively to loss of NPSH margin. For example, any measure to delay or avoid recirculation would address the three adverse effects mentioned in the comment. Other measures, such as ensuring sump screen integrity, are even more clearly intended to address the three effects. Therefore, justification for not implementing an example compensatory measure should examine all of the debris blockage effects identified in Bulletin 2003-01.

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20	Addressing Bulletin Concerns	The Bulletin lists three additional concerns related to post-LOCA debris issues; (1) Sump screen design DP and breaches/gaps, (2) blocking of reactor building drainage paths to the sump creating holdup volumes, and (3) debris clogging of components which have a smaller opening than the recirculation sump screens. Does the NRC expect each of these smaller issues to be fully addressed (with supporting analysis complete) under the IB 2003-01 response?	As discussed in the previous comment response, the interim compensatory measures listed in Bulletin 2003-01 are intended to address all of the debris blockage effects identified therein. The staff does not expect evaluations and corrective actions to be completed within the bulletin's response period because these activities may be complex and time-consuming. In fact, Bulletin 2003-01 does not address completing evaluations and implementing corrective actions. Instead, these items will be addressed in a proposed generic letter currently being developed by the staff. Finally, although the three debris blockage issues referred to in the comment may require less evaluation than loss of net positive suction head margin, the staff does not necessarily consider them to be of smaller safety significance for all PWRs.
21 *	Adequacy Measure	If a licensee implements changes (procedures, training, process, operation) as requested in Bulletin 2003-01, is it necessary to demonstrate the effectiveness of the changes.	As the staff expects that licensees' normal processes for implementing changes to procedures, training, and operations will be effective, Bulletin 2003-01 does not prescribe any special or additional demonstrations of effectiveness.
22 *	Current Licensing Basis	If backfitting is not intended by the Bulletin, and the licensing basis for a plant precedes RG 1.82, why is using DG-1107 appropriate for determination of compliance with existing regulatory documents? Is not the 50% blockage assumption, if used, still considered the current design basis, founded on the licensing basis, for operability determination?	No backfit is authorized in conjunction with Bulletin 2003-01. Therefore, Bulletin 2003-01 does not require that PWRs that base their operability determinations on 50% blockage change to other criteria. Although Draft Regulatory Guide 1107 is one acceptable methodology for demonstrating compliance with existing regulations, plants are not required to use it. However, the bulletin does request information concerning whether or not licensees evaluations of sump performance accurately consider the current state of knowledge regarding debris blockage effects. Thus, the submission of an Option 1 response invoking the 50% blockage assumption without a supporting mechanistic analysis would be contrary to the intent of Bulletin 2003-01. If a plant's current analysis does not accurately model debris blockage effects, the staff considers it prudent that affected licensees implement interim compensatory measures to mitigate any risk that may be associated with sump designs that may not be able to support long-term core cooling in accordance with 10 CFR 50.46(b)(5).

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23 *	Elements of Option 1 and 2	On page 8 of the bulletin with respect to the options, if a licensee has analyses to support their position, but not a complete reanalysis for the ECCS and CSS functions, is it acceptable to have a combined response (combining Option 1 and Option 2), or should the licensee respond to Option 2 with the analyses to compliment the compensatory measures?	In this case, the staff suggests that licensees choose the latter option. That is, licensees that have partially reanalyzed sump performance in response to the issues identified in Bulletin 2003-01 should respond using Option 2 and, if appropriate, compliment the interim measures with results and information from the reanalysis. The staff suggests that Option 1 only be chosen by licensees that have successfully completed the sump reanalysis process.
24 *	Elements of Option 1 and 2	May the response be a combination of options 1 and 2 in lieu of either option alone?	As explained above, the staff suggests that licensees choose either Option 1 or Option 2, but not both. If a licensee has completely reanalyzed the debris blockage effects identified in the bulletin and determined that compliance exists with current regulations, then Option 1 is appropriate. Otherwise, the staff suggests that Option 2 be chosen. The staff's response to comment 23 addresses partial reanalyses.
25	Elements of Option 1 and 2	If option 1 is elected alone or in combination with option 2, must the supporting analysis be submitted with the response?	The staff does not expect that detailed analyses will be submitted in response to Bulletin 2003-01. However, if Option 1 is chosen, the staff suggests that licensees state the guidance used for performing the evaluation and indicate that all of the debris blockage effects in the bulletin were addressed.
26	General Evaluations to determine compliance	What, if anything, is expected of the phrase: "while evaluations to determine compliance proceed" in the response section of the Bulletin (e.g., a commitment date or a long term plan)?	The cited phrase refers to the NRC's long-term strategy for ensuring adequate sump performance. No commitment or plan to perform an evaluation of debris blockage effects is required in response to Bulletin 2003-01. As explained at the top of Page 7 of the bulletin, however, the staff is preparing a generic letter which would request information from PWR licensees concerning debris blockage evaluations and corrective actions. Thus, the cited phrase (and the phrase in Option 2 of the Requested Information section that states "... until an evaluation to determine compliance is complete.") both refer to the proposed generic letter.

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27 *	Response Date	Given the large uncertainty in methodology(ies) and acceptable inputs to the individual plant evaluations for compliance with 10CFR50.46, will consideration be given to requests for extension of response date?	Although the staff considers extension requests on a case-by-case basis, the very purpose of Bulletin 2003-01 is to ensure that potential risks due to sump clogging are being minimized prior to the completion of debris blockage evaluations. Thus, the staff proposed a 60 day response period for the bulletin despite being aware that most licensees would be unable to complete an evaluation in that period. However, as discussed in the staff's response to comments 23 and 24, licensees that have partially analyzed debris blockage effects may respond by choosing Option 2 and complimenting the example interim measures with the preliminary or intermediate evaluation results.
28	Schedule for Implementation	For plants with a Fall Refueling Outage, is it an expectation to implement Compensatory Actions (other than Containment Cleanliness) that may require a plant modification prior to restart from the outage.	Bulletin 2003-01 does not require licensees to implement modifications used as interim compensatory measures prior to restarting from an outage. However, the staff expects that interim compensatory measures be implemented as soon as practical. If a licensee determines that an appropriate compensatory measure cannot be implemented prior to responding to the bulletin the delay should be justified.
29	Use of draft guidance	The bulletin offers draft Reg Guide DG-1107 as regulatory guidance for resolving the issues in the bulletin. However, industry provided extensive comments on the draft Reg Guide, and the draft without the comments incorporated may not be an adequate representation for the industry. When will the Reg Guide be finalized and to what extent is the draft applicable to issues in the bulletin?	Draft Regulatory Guide 1107 (DG-1107) is one acceptable approach for addressing the debris blockage effects identified in Bulletin 2003-01. Responses to public comments on DG-1107 and its conversion to Regulatory Guide 1.82, Revision 3 will not be complete until Fall 2003, after the required response date for the bulletin. Licensees may decide not to use DG-1107 until the NRC addresses the public comments associated with it; however, the staff reiterates that its present form may be used in relation to the bulletin.
30 *	Use of draft guidance	As delineated on page 7 of 13, 2nd paragraph does "are in compliance with existing applicable regulatory requirements" mean that compliance with Draft Regulatory Guide 1107 is required for compliance with this bulletin?	No; Draft Regulatory Guide 1107 (DG-1107) is not a regulatory requirement. Although consistency with DG-1107 can be used to demonstrate regulatory compliance, consistency with DG-1107 is not required for responding to the bulletin. The "existing applicable regulatory requirements" referred to in the cited passage are listed in the Applicable Regulatory Requirements section of Bulletin 2003-01.

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31 *	Option 1	If a plant elects to select Option 1, do all the items of DG 1107 (Draft Regulatory Guide 1.82 R3) need to be addressed?	Consistent with the staff's response to comment 30, it is possible to demonstrate regulatory compliance without demonstrating complete consistency with regulatory guidance. As the staff has not endorsed any other guidance for PWR licensees, however, licensees should have a basis for deviations from Draft Regulatory Guide 1107.
32	Option 1	Can a plant implement Option 1 by performing a realistically conservative bounding analysis?	The staff's intent was that Option 1 would be chosen by PWR licensees that had already completed a reanalysis of debris blockage effects prior to the issuance of Bulletin 2003-01. The staff did not consider it likely that many licensees could perform a realistically conservative analysis within 60 days that would be demonstrably acceptable and bounding. However, if a licensee is able to submit such an analysis within 60 days, it would be consistent with the intent of the bulletin.
33	Option 1	If a plant elects to select Option 1, can some of the items in DG 1107 be addressed qualitatively pending a more detailed analysis?	Full consistency with regulatory guidance is not required to demonstrate regulatory compliance. Thus, a licensee may be able to justify addressing certain aspects of debris blockage effects in a qualitative manner. However, as qualitative analyses are generally less precise than quantitative analyses, the staff would expect that sufficient conservatism be employed to ensure that uncertainties are accounted for.

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34	Option 1	<p>Our response to NRC Bulletin 2003-01 will be based on Option 1. Analyses were completed for our plant in 1992 in response to GL 85-22 and used the information presented in NUREG-0897. Information contained in NUREG/CR-6808 has been compared to the data and results contained in our analyses and, while the newer information is more detailed, the conclusions remain the same. The available NPSH is adequate given the amounts of debris generated and transported following a LOCA.</p> <p>We continue to review the NRC data and will be initiating a revision to our analyses. These revisions may not be completed prior the response deadline for the NRC bulletin. Therefore, our question for the NRC is: For those utilities that have analyses of record and need to update them based on this newer information, will Option 1 permit time to complete the necessary work considering that preliminary evaluations demonstrate adequate ECCS and CSS function?</p>	<p>The staff intends for Option 1 to be chosen by licensees that have completed debris blockage evaluations using accurate and conservative models prior to responding to the bulletin. Similarly to the response to comment 27, the staff considers allowing extensions for responses on a case-by-case basis. However, the staff issued Bulletin 2003-01 with the understanding that most addressees would not be able to complete debris blockage analyses within response period. The bulletin's intent is to ensure that any potential risk due to debris blockage is appropriately being mitigated until an evaluation can be completed. For this reason, the staff would generally suggest that PWR licensees that have not completed debris blockage evaluations choose Option 2 and use the partially completed or preliminary analysis to justify implementing less extensive compensatory measures.</p>
35	Option 1	<p>With respect to Option 1, are commitments to complete work permissible in the Bulletin response?</p> <p>What level of detail must be provided in supporting a statement that Option 1 is met?</p> <p>Current regulatory acceptance criteria are based on Revision 2 of Regulatory Guide (RG) 1.82. Will re-submission of information be required after Revision 3 to RG 1.82 is issued?</p>	<p>The staff has already addressed commitments to complete work as a basis for responding to Bulletin 2003-01 with Option 1 in response to comments 27 and 34. To summarize, such a response would not meet the intent of the bulletin.</p> <p>The staff has addressed the level of detail in response to comment 25. To recapitulate: although detailed analyses should be completed for all Option 1 respondents, the staff does not expect that detailed analyses will be submitted in response to Bulletin 2003-01. However, if Option 1 is chosen, the staff suggests that licensees state the guidance used for performing the evaluation and indicate that all of the debris blockage effects in the bulletin were addressed.</p> <p>In responding to Bulletin 2003-01, the Applicable Regulatory Guidance section of the bulletin indicates that Draft Regulatory Guide 1107 (DG-1107) provides acceptable guidance. RG 1.82, Revision 2, is not listed. No</p>

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		Is a document that demonstrates how each of the criterion of RG 1.82, Rev. 2 and/or Draft Guide 1107 acceptable to support Option 1?	<p>resubmission of information is expected for plants that use acceptable regulatory guidance in responding to the bulletin.</p> <p>Addressees are not required to submit a document to demonstrate that each regulatory position in DG-1107 is satisfied to support an Option 1 response. Further detail is provided in the second paragraph of this response.</p>
36	Option 1	If an analysis is performed pursuant to option 1, is the level of rigor and complexity left to the discretion of the licensee? (Given the short turn-around time available and the absence of industry guidance on methodology.)	<p>To a degree, the level of rigor and complexity for performing any evaluation is left to the discretion of the licensee. However, Bulletin 2003-01 does provide a framework for Option 1 responses by indicating that applicable guidance is provided in Draft Regulatory Guide 1107 (DG-1107). Licensees need not follow regulatory guidance, but DG-1107 provides an indication of the staff's expectations for the type of evaluation performed by Option 1 respondents. If a licensee uses reduced precision for certain parts of the analysis, the staff expects that the degree of conservatism be correspondingly increased. The staff is aware that a short turn-around time exists for responses, and has previously stated its objective in issuing Bulletin 2003-01 in response to comments 27 and 34.</p>
37	Adequacy Measure	The bulletin does not offer any quantification of adequate risk reduction. The bulletin references the generic PRA evaluation in LA-UR-02-7562 but does not indicate if plant-specific PRA evaluations are necessary to justify specific compensatory actions. Please clarify the expectation with respect to PRA evaluations for this bulletin.	<p>The staff does not expect that addressees will quantify risk reductions to demonstrate the adequacy of interim compensatory measures. The staff does, however, expect that addressees will have a qualitative understanding of how interim compensatory measures will affect risk. Licensees may use quantitative data to justify not taking an interim compensatory measure.</p>

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38	Comp Action	<p><u>Ensuring that alternate water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere</u></p> <ol style="list-style-type: none"> 1. Does the capability to refill the RWST need to be proceduralized? 2. This item does not say a plant should have a procedure to inject the water. It only addresses ensuring availability. Ensuring availability should not be inconsistent with a plant's licensing basis or any accident analysis. In fact it is required for implementation of a particular EOP and SAMG and could be viewed as consistent with a plant's licensing basis. 3. NUREG/CR-6808 acknowledges the issue of overfill on containment and can be used as a reason for plants not to replenish the RWST 4. If submergence becomes an issue by refilling the RWST, what guidance is available to weigh the benefits/risks? Is core cooling more important than indication 	<ol style="list-style-type: none"> 1. If a licensee plans to credit refilling of the RWST as an interim compensatory measure, the staff would expect the necessary operator actions to be proceduralized. 2. The staff agrees that interim compensatory measures should not invalidate plants' accident analyses. If an interim compensatory measure is necessary, plants' safety analyses may need to be reviewed and, if acceptable, revised to accommodate the interim measure. 3. Containment integrity should be considered in analyzing the acceptability of injecting coolant from alternative water sources. Many PWRs have margin between the current maximum pool depth and the depth which could result in a loss of integrity or structural failure of the containment. Therefore, although containment overfill should be a concern, many plants would likely be able to provide some quantity of additional injection from alternative sources without jeopardizing containment integrity. 4. Core cooling is more important than indication.
39	Comp Action	<p><u>More aggressive containment cleaning and increased foreign material controls</u></p> <p>What does 'more aggressive cleaning' and 'increased FME controls' mean? More aggressive than what reference? An increase as compared to what reference?</p>	<p>The cited phrases indicate that it may be appropriate for PWR licensees to take additional measures beyond those currently in place (i.e., the point of reference). For example, a plant with 100% reflective metallic insulation and a sump screen which is vulnerable to blockage from resident fibrous debris may find it appropriate to take additional measures to reduce the amount resident fibrous debris in containment. Consistent with the potentially increased vulnerability of containment sumps and associated structures and components to debris blockage, stricter controls may be appropriate to ensure that FME and cleanliness programs are capable of reducing foreign material and resident debris source terms to tolerable levels.</p>

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#	Topic	Question/Comment	NRC Response
40	Comp Action	<p>Ensuring containment drainage paths are unblocked</p> <p>What does 'unblocked' mean for drainage paths? Is this referring to normal operation, such as doors, gates, or barriers? Wire Mesh rad gates and scuppers permit flow, but not certain debris. Although drainage through these is not 'blocked' it could become a choke point post-LOCA, but an evaluation is needed to determine potential.</p>	<p>The example interim compensatory measures suggested in the bulletin include ensuring that debris is not currently restricting drainage flowpaths. In addition, licensees may also consider measures related to wire mesh and other debris-interdicting material at flow restrictions within containment.</p>
41	Comp Action	<p>Some reactor research empirical data appeared to indicate that the uniform insulation debris mat on the fine mesh sump screen would disengage from the screen when suction from the sump was terminated. There does not appear to be any discussion of this point in the NRCB. Should utilities consider termination of suction from the sump as one of the strategies in coping with the current sump performance issues?</p>	<p>In responding to this comment, the staff assumes that the commenter is asking whether the pumps taking suction from the sump should be stopped and then promptly restarted, rather than terminated altogether.</p> <p>Although some tests have shown that stopping and restarting pumps taking suction from the sump allows debris on the screen to disengage, unfortunately, many of these tests have also demonstrated that, if an appreciable amount of debris disengages, it does not fall far from the screen and can quickly reaccumulate once the pumps are restarted. Still, licensees should attempt to restore sump flow with all means at their disposal when it is needed during an accident.</p>
42	Comp Action	<p>Page 8 of the Bulletin states that: "The NRC staff recognizes that the implementation of certain compensatory measures involving containment entry may not be feasible until the next outage." Please provide clarification to this statement and include specific examples, if possible.</p>	<p>The staff does not intend to encourage licensees to incur potentially excessive doses by performing activities in containment (e.g., removing resident debris, searching for foreign material, ensuring sump screen integrity) in response to Bulletin 2003-01. Consistent with ALARA principles and the staff's risk-informed philosophy, licensees may justify delaying compensatory measures that involve potentially significant radiation doses during power operation.</p>

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#	Topic	Question/Comment	NRC Response
43	Comp Action	The third bullet on page 7 states: "ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere". What engineering documentation is necessary, if any, to support the acceptability of injecting additional water into containment (e.g. flood level, seismic)?	
44	Comp Action	How much dose is acceptable to allow on-line performance of inspections in containment (i.e., for debris, sump screen condition, flow path blockage)?	The staff has provided a qualitative response to this question in response to comment 42. In summary, the staff does not encourage incurring excessive doses for the interim compensatory measures listed in Bulletin 2003-01 which require containment entry. Licensees may consider the staff's guidance and should then apply their own judgment in considering the value of the interim measure and the expected dose associated therewith.
45 *	Comp Action	Is crediting existing programs (such as periodic sump inspections, containment cleaning and FME) acceptable as compensatory actions?	The staff included the parenthetical items as example interim measures in the bulletin despite the fact that such programs currently exist at many plants because it may be appropriate for licensees to strengthen the measures that are currently in place. For example, a plant with 100% reflective metallic insulation and a sump screen which is vulnerable to blockage from resident fibrous debris may find it appropriate to take additional measures to reduce the amount resident fibrous debris in containment. As another example, most licensees perform sump screen inspections. However, the rigor of the inspections may not be sufficient to detect potentially problematic gaps such as that found at Davis-Besse (and at a number of other plants, as described in GL 98-04), which were likely missed repeatedly by existing periodic inspections. Prior to taking credit for existing programs, licensees should carefully consider whether they are responsive to the bulletin concerns without modification.

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46	Comp Action	On page 7 of the bulletin with respect to the bullets, is it acceptable for licensees in their response to document conservatism in existing analyses in combination with or in lieu of the compensatory measures? For example, on bullet item 3, plants that have available margin for the BWST/RWT inventory between the technical specification limit/calculation assumptions and the actual available inventory, credit could be taken for this additional inventory, and administrative controls could be established to control this level to a higher limit.	The staff agrees that, as appropriate, conservatisms in existing analyses may be credited in combination with or in lieu of interim compensatory measures. Maintaining the RWST level close to its maximum allowable value is a good example of an acceptable conservatism that most plants could credit once administrative controls have been established.
47	Comp Action	Care needs to be exercised in the training of the operators to recognize indications of sump clogging. At present the two most common ways of attempting to detect sump screen clogging is to monitor flow and pump current. It should be noted however, that based on head loss experiments that I have conducted in the past that initially did not have a robust support for the screen, the flow rate did not change significantly while sufficient debris accumulate to cause failure of the screen. A failed screen would then allow debris ingestion into the ECCS potentially impacting the pumps and containment spray nozzles. Additionally, based on the NRC studies of the impact of debris on pumps, clogging of the pump bearing cooling channels may cause the pump to oscillate as the bearings freeze up resulting in a concurrent oscillation of the pump current. As such, should a screen fail mechanically, the operator could be presented with a situation where the containment spray flows start to reduce due to clogging of the containment spray nozzles together with possible pump current oscillations leading to the inappropriate diagnostic that sump screen clogging may be occurring. The LPI flow, however, would not be as impacted as the containment spray. A nominal LPI flow indication with indications of reduced containment spray flow would be a possible indication that sump screen failure had occurred. In this set of conditions the operator perhaps	<p>The staff agrees that non-negligible uncertainty exists in interpreting signals which may be used to indicate that sump blockage or other debris blockage effects are occurring.</p> <p>However, the staff does consider past head loss testing to be adequate for establishing a definitive basis to accurately distinguish between the responses of actual plant equipment to sump blockage and loss of sump screen integrity. There are so many plant-specific differences, and accident/response variables that it is not possible for the staff to endorse the methodology described in the comment as an appropriate way for PWR licensees to determine whether the sump screen is blocked or has failed structurally. In addition, under the high-stress conditions existent as operators respond to an accident, the methodology described in the comment appears too time-intensive and complex to have a reasonable chance of succeeding.</p> <p>It may be appropriate, however, for licensees to consider simpler and less uncertain inputs in distinguishing between sump blockage and loss of screen integrity. For example, gradually degrading pump performance and signs of cavitation from pumps with lower net positive suction head margins may indicate that a given pump is potentially approaching cavitation. More sudden, sharp changes in pump performance for all pumps taking suction on the sump may accompany the initial gulps of debris that infiltrated the</p>

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		should try to immediately switchover to other sources of clean water or shutdown the system while an alternative water source is established.	suction lines following a loss of screen integrity.
48	Comp Action	Turning off ECCS trains may not be appropriate for some plants. For example, based on the Davis Besse analysis, a mostly RMI plant should keep ALL ECCS trains running at full flow to ensure that as much RMI crumpled debris reaches the sump screen. The RMI debris will form a "beehive" accumulating on the sump screen creating a significantly increased surface area which would trap any miscellaneous fibers and preclude the formation of the thin bed effect. On the other hand, a plant with a mixture of significant quantities of fibers and Cal-Sil (and very little or no RMI) should implement procedures to delay switchover as long as possible and consider further reduction in flow after switchover such as intermittent operation of pumps. Note that some BWRs trip redundant trains 10 minutes after the accident – shortly after the time needed to identify that a LOCA has occurred.	For licensees that have not performed debris blockage analyses, it is difficult to recommend plant-specific strategies for coping with potential debris blockage effects. Even for licensees that have performed debris blockage analyses, their analyses are likely conservative in nature and may not provide an appropriate basis for making best-estimate decisions for the spectrum of non-bounding accidents which may be significantly more likely to occur. Furthermore, the staff does not consider it an appropriate practice to rely upon debris reaching the sump screen to demonstrate an acceptable head loss. Even if the flow velocity at the sump screen is relatively high, there is no guarantee that the flow velocities in the rest of the containment will be sufficient to transport RMI to the sump screen. Thus, the staff would not generally suggest that RMI-insulated plants should necessarily attempt to maximize flow.
49	Comp Action	Injection of alternative water sources has the associated issue of the impact of increased water level beyond the maximum pool level due to the current external water inventories. Issues such as impact on instrumentation and containment integrity should be addressed to establish the absolute maximum volume of alternative water that could be introduced into the system.	The staff agrees that licensees should consider the effects of injecting alternative water sources into containment, including instrumentation submergence and containment structural integrity.
50	Comp Action	Methods to delay going into a recirculation mode are clearly identified in the bulletin. However, methods to reduce or delay plugging of the ECCS Sump Strainers after switching to recirculation is not identified as a Compensatory Action. Was this intentionally excluded from the scope.	No.

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#	Topic	Question/Comment	NRC Response
51	Mitigating Factors	When responding under Option (2), should discussion of mitigating factors (NPSH margin, post-LOCA water depth, limited use of fibrous insulation, etc.) in the plant design and operation be included? Or should only the compensatory actions be addressed?	Bulletin 2003-01 does not request that PWR licensees discuss mitigating factors such as those identified in this comment. However, licensees may elect to do so. In particular, a discussion of mitigating factors may be appropriate for licensees attempting to justify that an example compensatory measure in the bulletin is unnecessary for their plant.
52	Operator Action	Operator action to reduce flow to the core following an event to delay switchover to recirculation is not an advisable compensatory action. It is counter intuitive to maintaining core cooling and preventing core damage. Any guidance to reduce core flow would have to go through industry review before implementation.	Bulletin 2003-01 includes the reduction of flow to the reactor core as an example interim compensatory measure. Although reducing flow to the reactor core may be counterintuitive, this action may reduce risk for plants with particularly vulnerable recirculation sumps. The staff recognizes that licensees are required to review changes to their plants to ensure that changes do not have an adverse effect on safety. In responding to the bulletin, a licensee may justify not implementing this compensatory measures within the 60 day response period because of the detailed prerequisite safety review. In addition see the staff's comments in response to comment 7, above.
53	Operator Training	<p><u>Operator Training on indications of and responses to sump clogging</u></p> <ol style="list-style-type: none"> 1. What is the intent of the training? Is it sufficient just to impart knowledge of the phenomenon, or is it assumed the training is to support accompanying procedure changes? 2. For "interim corrective actions" it seems acceptable to add instructions to monitor pre-identified parameters for indications of degraded sump performance. As long as no operator action is directed, deviation from a plant's licensing basis does not occur. 3. Must all potential responses to indications of sump clogging be proceduralized or can 10CFR50.54.X be invoked? 4. For "interim corrective actions," is it acceptable to add instruction to direct the "plant engineering staff" to evaluate and recommend mitigating actions with the understanding that implementation will likely 	<ol style="list-style-type: none"> 1. 2. Bulletin 2003-01 suggests that addressees consider "operator training on indications of and responses to sump clogging." The staff would not consider it reasonable to request the monitoring of degrading sump performance without taking corrective or alternative actions to ensure core cooling can be provided. 3. 4. 5. 6. As the interim compensatory measures requested in the bulletin are intended as risk reduction measures, the staff finds that non-qualified components and non-Regulatory Guide 1.97 instrumentation may be used for this purpose. 7. 8.

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		<p>require invoking 10CFR50.54.x?</p> <p>5. Can all plants (or even some plants or any single plant) provide a definitive set of symptoms the “plant engineering staff” or control room operators can use to conclude sump performance is “degraded” sufficiently to require implementation of mitigating actions?</p> <p>6. Is it necessary for “interim corrective actions” that the instruments use for the determination be environmentally qualified?</p> <p>7. A particular EOP directs actions that are not consistent with the plant accident analyses and certain portions of plant licensing basis. These actions include reduction of ECCS and CSS flow. This guideline is currently implemented; however, only for “beyond design basis” events where it has been positively identified that ECCS recirculation flow cannot be established or has been lost. Can plants make a case in a 50.59 evaluation that it is acceptable to “pre-emptively” implement strategies in this EOP?</p> <p>8. Can PSA determinations be used in 50.59 evaluations to demonstrate that “temporarily” incorporating mitigating actions that are not consistent with a plant’s accident analyses is acceptable based on the impact on CDF?</p>	
54 *	Option 2	If Option 2 is selected, should the selected compensatory measures need to be quantitatively evaluated as to their potential risk reduction?	The staff does not expect a quantitative evaluation of the potential risk reduction achieved by the interim compensatory measures implemented in response to Bulletin 2003-01. However, licensees should have a qualitative awareness that the interim measures implemented are effective.

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#	Topic	Question/Comment	NRC Response
55	Option 2	If Option 2 is selected, does the plant need to address the structural integrity, flow path blockage, and downstream effects issues?	Regardless of whether Option 1 or Option 2 is selected, a licensee needs to address all of the debris blockage effects identified in the bulletin, including: (1) loss of pumps' net positive suction head margin, (2) structural integrity of the sump screen, (3) containment drainage path blockage, and (4) blockage at flow restrictions downstream of the sump screen. If Option 1 is selected, a licensee is stating that none of these debris blockage effects interferes with regulatory compliance. If Option 2 is selected, a licensee may elect to implement compensatory measures to address these adverse effects, or justify why compensatory measures are unnecessary.
56	Option 2	What is meant in Option 2 by "until evaluation to determine compliance is complete."	An Option 2 response to Bulletin 2003-01 may indicate that a licensee has not completed an evaluation of regulatory compliance in light of the most recent research concerning debris blockage. The intent of the bulletin is that interim compensatory measures would be in place to reduce any risk due to potentially degraded sump performance until it is known with certainty whether or not the sump is degraded. As explained further in the response to comment 26, the staff intends to issue a generic letter concerning debris blockage evaluations and potential corrective actions. However, licensees are not precluded from performing evaluations prior to the issuance of the generic letter.
57	Option 2	What type of compliance evaluations need to be started to be performed if a plant elects to select Option 2?	If a licensee selects Option 2, no commitment or plan to begin performing a debris blockage evaluation is required for responding to Bulletin 2003-01. As stated in response to comment 26, however, the staff is preparing a generic letter to request information concerning debris blockage evaluations and potential corrective actions.

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58	Option 2 Prior NRC Review and Approval	Some compensatory measures may require prior NRC review and approval. For example, reducing the injection flow rates (prior to transfer to recirculation) could allow more time for debris sources to settle and be a tremendous benefit. One means of reducing injection flow rates is to secure one train of injection. However, subsequently, if this train fails (single active failure) the operators would need to restart the secured train. This would be substitution of manual operator action for automatic action. And it appears would require prior NRC review and approval. Given the risk significance of the sump blockage issue as discussed in Bulletin 2003-01, would the NRC find these types of actions to be acceptable.	
59	Option 2 PSA assessment of Comp Measures	Does the PSA impact of compensatory measures need to be assessed and/or quantified?	As explained in the staff's response to comment 54, the staff does not expect a quantitative evaluation of the potential risk reduction achieved by the interim compensatory measures implemented in response to Bulletin 2003-01. However, licensees should have a qualitative awareness that the interim measures implemented are effective.
60	Option 2 EOPs	Do EOP/TSC procedure revisions need to be in place by submittal, or is a schedule to do so adequate?	Due to the spectrum of lead times required for implementing various interim compensatory measures, rather than choosing an arbitrary deadline, the staff requested that interim measures be implemented as soon as practical. The staff recognizes that procedural revisions require safety reviews prior to their implementation, and that the complex nature of certain measures may require more than 60 days to fully evaluate. Implementing all compensatory measures within the 60 day response period is not the intent of the bulletin. However, if it is impractical to implement an appropriate compensatory measure within the 60 day response period, Bulletin 2003-01 requests the basis for concluding that implementation at an early time is not practical.

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61	Option 2 Consistency w/ licensing basis	Some of the compensatory measures listed in the Bulletin are inconsistent with the accident analyses and/or licensing basis of a majority of PWRs.	Bulletin 2003-01 does not intend for licensees to implement compensatory measures that invalidate their safety analyses. If an interim measure is inconsistent with safety analyses, licensees should either (1) not implement the measure or (2) revise the safety analysis (including NRC review and approval if required) and then implement the measure.
62	Option 2 Operability	Does selection of Option 2 by inference signify that the plant's ECCS sump would be impaired by LOCA induced debris?	Licensees responding to Bulletin 2003-01 by choosing Option 2 have likely not completed a successful evaluation of the debris blockage effects identified in the bulletin in accordance with the current state of knowledge. From this observation, however, it does not logically follow that the absence of a debris blockage evaluation means that all Option 2 respondents' sumps are degraded.
63	Option 2 Operability	As evaluations proceed, should operability of sump screen become questionable, are the interim compensatory measures established in the Bulletin response adequate until all analyses and modifications are completed?	As discussed further in the staff's response to comment 72, the implementation of interim compensatory measures in response to Bulletin 2003-01 does not indicate that a degraded or nonconforming condition exists. Instead, the intent of the interim measures is to ensure that potential risk due to debris blockage is minimized. Thus, once PWR licensees complete an evaluation of the adequacy of their sumps' performance, they may determine that a different set of compensatory measures is necessary to compensate for a degraded or nonconforming condition (as defined in Generic Letter 91-18, Revision 1) than to mitigate potential risk.

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64	Option 2 Prior NRC Review and Approval	The recommended interim compensatory measures include: procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently) Based on 50.59 evaluations, such procedural changes could result in a "Yes" to the question: "Does the proposed activity create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the FSAR?" Therefore, prior NRC approval (License Amendment) would be required prior to implementation of these changes. Is the NRC prepared to issue license amendments within 60 days of the date of the bulletin?	<p>The NRC does not consider that emergency operating procedures directing operators to take control of equipment during an accident necessarily violate design requirements. For example, if ECCS functions properly during a LOCA a major core melt would be precluded and there would be no need to use sprays to reduce doses. Thus, although the need for NRC review still must be examined, prior review and approval of such changes is not necessarily required,</p> <p>If a licensee determines that a license amendment is appropriate, the staff will review the amendment. Licensees would be allowed to consider the staff's review time as a practical reason for delaying implementation of a compensatory measure.</p>
65	Prior NRC Review and Approval	Actions such as turning sprays on only intermittently would require a licensing amendment for my station due to crediting sprays for dose reduction under 10CFR100. The current design/licensing basis requires operation of sprays for several hours. Is the NRC receptive to performing expedited reviews for an amendment of this nature.	<p>The NRC does not consider that emergency operating procedures directing operators to take control of equipment during an accident necessarily violate design requirements. For example, if ECCS functions properly during a LOCA a major core melt would be precluded and there would be no need to use sprays to reduce doses. Thus, although the need for NRC review still must be examined, prior review and approval of such changes is not necessarily required,</p> <p>Therefore, if a licensee determines that intermittent operation of the sprays is an appropriate interim compensatory action to reduce risk considering their plant-specific situation, and also determines that prior NRC review is needed, the staff will review the amendment. Licensees would be allowed to consider the staff's review time as a practical reason for delaying implementation of a compensatory measure.</p>
66	Procedures	<p><u>Procedure modifications, if appropriate, that would delay the switchover to containment sump recirculation</u></p> <p>1. What is intended by the phrase: "if appropriate"?</p>	<p>1. Bulletin 2003-01 uses the phrase "if appropriate" on page 7 to indicate that licensees should not implement interim compensatory measures that are contrary to their safety analyses. To further clarify, the cited phrase does not necessarily indicate that rejection of such a compensatory measure is the only option; rather, some licensees may determine that it is appropriate to modify their safety analyses</p>

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		<p>2. What is the objective for delaying switchover? Is it to reduce flowrates to the sump screens? Is it to delay any occurrence of degraded sump performance so the "plant engineering staff" can perform the evaluation versus control room operators?</p> <p>3. If the redundant train of cooling is secured early, can PSA determinations be used to demonstrate that the train can likely be successfully restarted with little or no impact on plant's CDF?</p> <p>4. For LBLOCA shutting down the redundant RHR pump does not seem prudent at all, regardless of the low probability of failure of the remaining pump and fact that high head SI pumps can remain in service. Securing the redundant CSS pump early is more palatable, even for plants that require CSS operation for alternate source term assumptions.</p>	<p>to be consistent with a given compensatory measure.</p> <p>2. The objective of delaying the switchover to sump recirculation is to delay, mitigate, or prevent altogether the deleterious effects of debris blockage on cooling to the reactor core and containment atmosphere. Some of the main benefits of delaying recirculation include (1) for small-break loss-of-coolant accidents (LOCAs), operators may be able to cool the plant to residual heat removal entry conditions without having to enter the potentially degraded recirculation mode (2) for larger LOCAs the decay heat load from the core will be reduced, and the risk of offsite radiation exposure will be decreased as long as the core is successfully being cooled, and (3) sump performance will improve if the switchover to recirculation mode is sufficiently delayed because debris will have additional time to settle, flow velocities will be reduced so that less debris is transported to the screens, there will be less force to potentially fail the screens and the flow rates necessary to cool the core will be reduced.</p> <p>3. PRA evaluations can be used to in part to demonstrate that a redundant train that has been secured early in an accident can be successfully restarted without a significant impact on a plant's core-damage frequency. However, as explained in the staff's response to comment 58, prior NRC approval may be necessary for the substitution of a manual action for an automatic action.</p> <p>4. The intent of Bulletin 2003-01 is not to recommend that all PWR licensees should secure the redundant train of the low-pressure safety injection system as an interim compensatory measure. Rather, the intent of the bulletin is for licensees to consider the measure. Although the staff would not recommend the securing of redundant trains of emergency core cooling or containment spray system as a long-term action or for plants which have preliminary determinations of adequate sump performance, this measure may provide risk benefit for plants whose sump performance is potentially degraded. Licensees have the primary responsibility for maintaining the safety of their facilities. See also the staff's</p>

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		<p>5. Why is shutting down redundant pumps during RWST injection a consideration for recirculation NPSH concerns that may not even occur? In high flow situations (e.g. LBLOCA), where NPSH is most challenged, this would delay switchover to recirculation very little (minutes) and adds time critical steps to the operator duties. In low flow situations (e.g. SBLOCA), this may be reasonable, but it is doubtful that sump water will be hot enough, or flow across the screen high enough, to warrant actions strictly for precluding pump cavitation when NPSHr is very low (low flow).</p>	<p>response to comment 7.</p> <p>5. As discussed by the staff in part 2 of this comment, preventing the possibility of the loss of pumps' net positive suction head (NPSH) margins is one of the primary reasons for securing redundant emergency core cooling system and containment spray pumps. Although it is true that for a particular accident, the success of sump recirculation cannot be determined until it is challenged, the NRC research and analysis described in Bulletin 2003-01 demonstrates that detrimental debris blockage concerns are credible for the population of domestic PWRs, and that a considerable fraction of plants may have concerns, even for small and medium breaks. The staff's research and analysis on sump performance also demonstrates that the challenge to pumps' NPSH margins is not necessarily greatest during a large-break LOCA. Rather, these calculations are plant-specific and the actual results may be counterintuitive. As an example, for certain plants with partially submerged sump screens during a small-break LOCA, this accident may present the greatest NPSH margin challenge.</p>
67	Procedures	<p>The bulletin suggests changing the emergency operating procedures to shutdown ECCS pumps or throttle flow. Responsible changes to emergency operating procedures require significant effort between licensees and owners' groups to ensure adequate preparation, evaluation, review, and distribution of generic changes. The evaluation of proposed changes against assumptions in the safety analyses can take considerable time. NRC should provide an acceptable timeframe that considers a responsible evaluation and implementation of procedure changes.</p>	<p>Bulletin 2003-01 recognizes that licensees may not be able to complete safety reviews for changes to emergency operating procedures that direct operators to reduce flow to the reactor core prior to submitting a response. For this reason, the bulletin allows licensees that are unable to implement a compensatory measure within 60 days to justify why the implementation within this period was not practical. Licensees determining that they need to delay the implementation of a compensatory measure should propose an extension period that is practical in their bulletin responses, and the NRC will review these periods to ensure that the intent of the bulletin was met.</p>
68	Procedures	<p>On page 7 of the bulletin with respect to the second bullet, "In the event of an actual high-energy line break (HELB) at a PWR leading to recirculation operation of the ECCS, there will not be any indications that debris capable of blockage is, in fact, being generated and transported to the ECCS sump until recirculation is</p>	<p>It is the intent of Bulletin 2003-01 to suggest that, only on an interim basis, PWR licensees consider securing redundant emergency core cooling system and/or containment spray pumps prior to recirculation in the absence of indications that debris blockage will impair or prevent recirculation. Prior to actually attempting sump recirculation, there is no reliable</p>

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		<p>initiated. Depending on the break size, the time to recirculation can be 20 minutes to several hours. It is <u>only</u> during this time, <u>prior</u> to recirculation, that deliberate operator actions can be taken to “delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently)”. Emergency Operating Procedures (EOPs) and licensed operator training, both classroom and simulator, for responding to a Loss of Coolant Accident (LOCA) provide for the operation of both redundant trains of ECCS and CSS if they are available as well as the restoration of redundant trains if lost, even though it is recognized that plant design and safety analyses demonstrate the adequacy of a single train to mitigate accident consequences. Is it the intent of this bulletin to suggest that in light of this issue, EOPs and Operator training should be modified, even on an interim basis, to include securing of redundant ECCS and/or CSS pumps prior to recirculation in the absence of indications that debris capable of blockage is in fact being generated and transported to the ECCS sump?</p>	<p>way to determine whether or not it will function as designed or fail due to debris blockage for a given accident. As explained in the staff’s response to comment 66, however, NRC research and analysis has demonstrated that the debris blockage concerns identified in the bulletin are credible for the population of domestic PWRs, and that some PWRs may be affected by these concerns even during small- or medium-break loss-of-coolant accidents. In light of the NRC’s research and analysis, the staff would not consider it prudent for operators of a plant that is likely to be affected by these concerns to take no actions to reduce the potential risk of debris blockage until indications of debris blockage actually occur during recirculation. Once indications of debris blockage occur, it would likely be too late for operators to take many of the actions which would be most effective in preventing the interruption of core flow due to debris blockage.</p>
69	Procedures	<p>Modifications to Emergency Operating Procedures to require throttling and/or securing operating ECCS pumps is counter to intuitive thinking and operator training with regard to emergency core cooling. Extensive safety review would be necessary to implement such a procedure change. The operating culture at most plants would make this a hard change to get approved.</p>	<p>Bulletin 2003-01 recognizes that extensive safety reviews may be required for changing procedures to reduce flow to the reactor core, and that licensees may not be able to complete safety reviews for these changes prior to submitting a response. The response to comment 67 provides further discussion on justifying the extended response period. Reducing core flow may be counterintuitive and present a challenge for licensees to implement; however, as discussed in the staff’s response to comment 68, plants for which debris blockage is likely may achieve risk benefit from implementing such a change. As such, some licensees may find this measure appropriate for meeting the intent of the bulletin.</p>

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#	Topic	Question/Comment	NRC Response
70	Schedule for Implementation	The effects of shutting off pumps or not starting pumps has not been fully evaluated and is counter intuitive to operator training. Additional time is required to properly evaluate this change. This could be done on a generic industry level to properly consider all the effects. A time frame of 60 days is insufficient to perform this evaluation.	Bulletin 2003-01 recognizes that licensees may not be able to complete safety reviews for changes to emergency operating procedures that direct operators to reduce flow to the reactor core prior to submitting a response. For this reason, the bulletin allows licensees that are unable to implement a compensatory measure within 60 days to justify why the implementation within this period was not practical. Licensees determining that they need to delay the implementation of a compensatory measure should propose an extension period that is practical in their bulletin responses, and the NRC will review these periods to ensure that the intent of the bulletin was met.
71 *	GL 91-18	Use of Option 2 (preliminary compensatory measures) does not, in and of itself, invoke the Generic Letter 91-18 Process (resolution of degraded and nonconforming conditions).	By responding to Bulletin 2003-01 through Option 2, a licensee does not necessarily indicate that it is not in compliance with existing regulatory requirements. Thus, the selection of Option 2 similarly does not necessarily indicate that a degraded or nonconforming condition exists as defined in Generic Letter 91-18, Revision 1.
72 *	GL 91-18	Industry is concerned that “compensatory measures” in the context of the Bulletin will be confused with “compensatory measures” in the context of the Generic Letter 91-18 Process. They are not the same. Compensatory measures taken in response to the Bulletin are preliminary in the sense that a degraded condition is not verified until the functional analysis has been completed. At that point, the licensee will have confirmed operability, identified a degraded condition, or declared the system inoperable.	The interim compensatory measures described in Bulletin 2003-01 are measures intended to compensate for any risk which may be associated with potentially degraded conditions with respect to sump performance.
73 *	General	Industry considers all PWRs to be operable (with respect to this issue) pending the results of a rigorous FA. The results of each plant-specific functional assessment will determine the plant’s status with respect to compliance, operability, and corrective actions (if any).	It is the continuous responsibility of each licensee to ensure that sump performance supports the operability of the emergency core cooling system and containment spray system, as applicable.

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